

WHAT IS CLAIMED IS:

1. A thin film magnetic head comprising:
an insulating gap layer provided between cores
made of a magnetic material; and
5 a coil for inducing a recording magnetic field
in the cores,
wherein the gap layer comprises a SiON film.

2. A thin film magnetic head according to Claim 1,
wherein the Young's modulus E of the gap layer is $E > 123.2$ (GPa).
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3. A thin film magnetic head according to Claim 2,
wherein the atomic ratio of N of the SiON film is $0 \text{ (at\%)} < N \text{ atomic \%} \leq 6 \text{ (at\%)}.$

4. A thin film magnetic head according to Claim 2,
wherein the Young's modulus E of the gap layer is $E \geq 127.4$ (GPa).
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5. A thin film magnetic head according to Claim 4,
wherein the atomic ratio of N of the SiON film is $1 \text{ (at\%)} \leq N \text{ atomic \%} \leq 6 \text{ (at\%)}.$

6. A thin film magnetic head comprising:
an insulating gap layer between cores made of a
magnetic material; and
a coil for inducing a recording magnetic field
in the cores,
25 wherein the gap layer comprises a SiO_2 film,
and
wherein the Young's modulus E of the gap layer
is $E > 123.2$ (GPa).

7. A thin film magnetic head according to Claim 6,
wherein the Young's modulus E of the gap layer is $E \geq 127.4$ (GPa).

5 8. A thin film magnetic head comprising:
a magnetoresistive element capable of detecting
a recording signal due to a change in electric resistance
with an external magnetic field; and

10 shield layers formed above and below the
magnetoresistive element with gap layers provided
therebetween,

wherein at least one of the gap layers
comprises a SiON film.

15 9. A thin film magnetic head according to Claim 8,
wherein the Young's modulus E of at least one of the gap
layers is $E > 123.2$ (GPa).

10 12. A thin film magnetic head according to Claim 9,
wherein the atomic ratio of N of the SiON film is $0 \text{ (at\%)} < N \text{ atomic \%} \leq 6 \text{ (at\%)}.$

20 11. A thin film magnetic head according to Claim 9,
wherein the Young's modulus E of the gap layers is $E \geq 127.4$ (GPa).

25 12. A thin film magnetic head according to Claim
11, wherein the atomic ratio of N of the SiON film is $1 \text{ (at\%)} \leq N \text{ atomic \%} \leq 6 \text{ (at\%)}.$

13. A thin film magnetic head comprising:

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a magnetoresistive element capable of detecting a recording signal due to a change in electric resistance with an external magnetic field; and

5 shield layers formed above and below the magnetoresistive element with gap layers provided therebetween,

wherein at least one of the gap layers comprises a SiO_2 film, and

10 wherein the Young's modulus E of at least one of the gap layers is $E > 123.2$ (GPa).

14. A thin film magnetic head according to Claim 13, wherein the Young's modulus E of at least one of the gap layers is $E \geq 127.4$ (GPa).

15 15. A method of manufacturing a thin film magnetic head comprising:

arranging a target and a substrate opposite to the target in a deposition apparatus; and

forming a gap layer of the thin film magnetic head,

20 wherein in forming the gap layer, a target composed of SiO_2 is prepared, and then sputtered with N_2 gas used as a sputtering gas flowing into the apparatus to form the gap layer comprising a SiON film.

25 16. A method of manufacturing a thin film magnetic head according to Claim 15, wherein the flow rate ratio of the N_2 gas in the sputtering gas is $0\% < \text{flow rate ratio of } \text{N}_2 \text{ gas} \leq 30\%$.

17. A method of manufacturing a thin film magnetic head according to Claim 16, wherein the flow rate ratio

of the N₂ gas is preferably in the range of $5\% \leq \text{flow rate ratio of N}_2 \text{ gas} \leq 30\%$.

18. A method of manufacturing a thin film magnetic head according to Claim 15, wherein forming the gap layer, comprises supplying a bias electric power to the substrate side.

19. A method of manufacturing a thin film magnetic head comprising:

arranging a target and a substrate opposite to the target in a deposition apparatus; and

forming a gap layer of the thin film magnetic head,

wherein in forming the gap layer, the target composed of SiO₂ is prepared and then sputtered with the bias electric power supplied to the substrate to form the gap layer comprising a SiO₂ film having a Young's modulus E of $E > 123.2 \text{ (GPa)}$.

20. A method of manufacturing a thin film magnetic head according to Claim 19, wherein the bias electric power is equal to or greater than 10 W.